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THE UNIVERSITY OF ALBERTA

THE ACHIEVEMENT OF ALL THAI INDUSTRIAL ARTS
STUDENTS IN THE THAI COMPREHENSIVE SCHOOL PROJECT

by



VITON UPATHAMP

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "The Achievement of all Thai Industrial Arts Students in the Thai Comprehensive School Project," submitted by Vitoon Upathamp, in partial fulfilment of the requirements for the degree of Master of Education.

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ABSTRACT

This study identified the results of the Alberta Training Program arranged by The University of Alberta for the thirty-one industrial arts participants involved in the Comprehensive School Project from the year 1966 through 1970. Specific data used in the study was the results of their course work from their Graduate Diploma in Education Program in the forms of GPA, grades, and scores. The t-test and the Pearson's Product-Moment Coefficient of the Correlation were used for data analysis and interpretation.

The findings indicated satisfactory in the achievement of all Thai industrial arts participants who were trained by The University of Alberta, although they were weak in English. Hopefully, the study will be helpful to the Government of Thailand by providing information for effective selection, diagnosis, and placement procedures for Thai industrial arts students who wish to study abroad. Also, the results will be useful to The University of Alberta for considering and improving the operation of such training program.

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CHAPTER I

INTRODUCTION

In a rapidly developing society such as that found in Thailand, there is frequently need to assess various facets of the society to determine whether it is in keeping with planned goals and aspirations. In light of the need for the development of human resources and manpower in Thailand, the Ministry of Education believes that secondary education should be given high priority and plays a crucial role in meeting societal and economic goals.¹ The need for broadly educated secondary graduates is urged in Thailand's national plans for development.

Various studies, reports, conferences, and other types of assessment have been conducted and projects planned to meet these needs. Among the more significant of these reports was the Preliminary Assessment of Education and Manpower in Thailand, the report of a joint Thai-USOM (Thai-United States Organizational Mission) Task Force in 1963. Included in the many recommendations made by this Task Force report was one that recommended that a more intensive study of secondary education, particularly vocational and academic education, be made as to how these forms of education are meeting the country's manpower needs.

In order to accommodate this recommendation, some of the nation's secondary schools were changed into

experimental comprehensive type high schools. The curriculum for these schools combines both academic and industrial arts areas. This curriculum is intended to meet both the needs of those who will not be continuing their education in a college or university and those who wish a higher education.

The importance placed on the development of comprehensive schools was further emphasized in the Second National and Economic Development Plan (1967). The summary of this plan states that:

At the secondary level, major efforts are to be made towards the expansion of comprehensive schools so the students will be guided towards studies of practical utility, especially (to) the vocational high schools which are oriented towards the vocational academic standard of the general secondary education and will be strengthened to meet pre-university requirements.

A result of the assessment of the plan was that the Ministry of Education within a six year period (1967-1972) spent in excess of twenty-five million dollars (521,230,000 baths) in an effort to foster the development of industrial arts education at the secondary school level. Another result of these studies was that the organizational pattern of the secondary schools was changed to the form of a comprehensive school.

To assist Thailand in reorganizing its secondary schools into comprehensive schools, the Government of Thailand sought the assistance of the Government of Canada. Through the then External Aid Office which has now been changed to the CIDA (Canadian International Development Agency), the Government of Canada made available to the

Government of Thailand a one million dollar interest free loan. The money was to be spent by the Thai Government for purchase of equipment manufactured in Canada for industrial arts shops involved in the Comprehensive School Project. This equipment was to be used to equip the thirteen industrial arts shops and one shop for the inservice training of new industrial arts teachers. Other assistance involved in the aid program was used for educating teams of teachers, administrators, and supervisors in a Canadian University who would provide leadership in teaching and administering the comprehensive schools upon their return to Thailand. The CIDA aid contract also called for an advisory team from the donor country which would be assigned to Thailand during the tenure of the project.

Both the donor country and the receiving country agreed to make the educational change from academic or vocational schools to comprehensive schools in a limited number of secondary schools and in gradual steps. The Thai Government established the Comprehensive School Project within the Department of Secondary Education of the Ministry of Education. It was agreed that only twenty secondary schools in various parts of the nation (see Fig. 1) would be involved in the Comprehensive School Project. At the present time, the twenty secondary schools selected to be involved in the Comprehensive School Project are fully operational as far as their academic program is concerned.

Because the current plan for secondary education



Figure 1

The location of Twenty Comprehensive Schools in Thailand

emphasized the vocational preparation of Thai students, the industrial arts program has been improved, modified, and made an integral part of the curriculum at the secondary school level in Thailand. The Canadian aid program has played an important role in assisting implementation of the teaching and learning of industrial arts in secondary schools of Thailand from 1966 through 1970. An important feature of the aid program to Thailand was to provide and bear the cost of a training program for the preparation of thirty-one industrial arts teachers and supervisors together with 129 participants of other academic areas in a Diploma Program at The University of Alberta which would have a heavy concentration in industrial arts. The industrial arts teachers and supervisors were divided into five groups and each group studied industrial arts courses as a major field of concentration for one academic year. The first group of Thais took these courses in 1966 and the last group in 1970. After completing the industrial arts program at The University of Alberta, these graduates were considered to be the key personnel for implementation of the industrial arts programs in the twenty comprehensive schools in Thailand. It was also expected that these people would assume teaching roles in industrial arts.

All twenty-one participants have successfully finished their programs and are either teaching industrial arts in one of the twenty comprehensive schools or working as supervisors in the central office of the Comprehensive

School Project. Until now the scholastic achievement of these thirty-one industrial arts participants at The University of Alberta has not been identified through systematic research.

Statement of the Problem

The purpose of this research will be to attempt to identify the results of the training program arranged by The University of Alberta for the thirty-one industrial arts participants involved in the Thai Comprehensive School Project. The study would be helpful to the Government of Thailand by providing information for effective selection, diagnosis, and placement procedures for Thai industrial arts students who wish to study abroad in less time and at less cost. Also the study would be of benefit both for the success of Thai industrial arts participants and for industrial arts student personnel presently studying at The University of Alberta. The results of this study would also be useful to The University of Alberta for improving the operation of such training programs.

Objectives of the Study

The major objective of this study was to identify the significant relationships existed between the Mean Final GPA (Grade Point Average) of the industrial arts course scores and the related course scores of all Thai industrial arts participants, and to identify the significant differences in various academic areas between industrial arts

participants and other academic participants. Also the study was to clarify which variables were the best predictors of the Mean Final GPA of the industrial arts course scores for those participants.

The study has been more specifically designed to have the following minor objectives:

1. To determine if a significant difference existed between Mean Final GPA in all industrial arts course scores of all industrial arts participants and the Mean Final GPA in all course scores of the total Graduate Diploma in Education participants for the 1966 through 1970 groups.
2. To determine if a significant difference existed in the Mean Final Scores of Vocational Education 361 between the industrial arts participants and the other academic participants who took the same course for 1968 and 1970 groups.
3. To determine if a significant difference existed in the Mean Final Scores of TOEFL (Test of English as a Foreign Language) between all industrial arts participants and the total participants for the 1967 through 1970 groups.
4. To determine if a significant difference existed in the Mean Final GPA in all course scores of Graduate Diploma in Education between the industrial arts participants and the total participants for the 1966, 1967, 1968, and 1970 groups.
5. To determine if a significant difference existed in the Mean Final GPA of all industrial arts course scores between the industrial arts background participants and the

non-industrial arts background participants for the 1966 through 1970 groups.

6. To determine if a significant difference existed in the Mean Final GPA of all related course scores between the industrial arts background participants and non-industrial arts background participants for the 1966 through 1970 groups.

7. To determine if a significant relationship existed between the Mean Final GPA in all industrial arts course scores of the industrial arts participants and their Mean Final GPA in all related course scores for the 1966, 1967, 1968, and 1970 groups.

8. To determine if there is a significant relationship between the Mean Final GPA in all industrial arts course scores of all industrial arts participants and their Mean Final Scores of TOEFL for the 1967 through 1970 groups.

9. To determine if a significant relationship existed between the Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts course scores for the 1966 through 1970 groups.

10. To determine if a significant relationship existed between the Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 groups.

Research Hypotheses

The following hypotheses were applied to this study:

1. The mean Final GPA in all industrial arts course scores of all industrial arts participants was significantly higher than the Mean Final GPA in all course scores of the Graduate Diploma in Education of the total participants for the 1966 through 1970 groups.
2. The Mean Final Scores in Vocational Education 361 of the industrial arts participants were significantly higher than the Mean Final Scores in the same course of the other academic participants for the 1968 and 1970 groups.
3. No significant difference existed in the Mean Final Scores of TOEFL between all industrial arts participants and the total participants for the 1967 through 1970 groups.
4. No significant differences existed in the Mean Final GPA in all course scores of the Graduate Diploma in Education between all industrial arts participants and the total participants for the 1966, 1967, 1968, and 1970 groups.
5. The Mean Final GPA in all industrial arts course scores of the industrial arts background participants was significantly higher than the Mean Final GPA in the same course scores of the non-industrial arts background participants for the 1966 through 1970 groups.
6. No significant difference in the Mean Final GPA of all related course scores between the industrial arts background participants and the non-industrial arts background participants for the 1966 through 1970 groups.

7. The Mean Final GPA in all industrial arts course scores of the industrial arts participants were significantly higher than their Mean Final GPA in all related course scores for the 1966, 1967, 1968, and 1970 groups.

8. No significant relationship existed between the Mean Final GPA in all industrial arts course scores of all industrial arts participants and their Mean Final Score of the TOEFL for the 1966 through 1970 groups.

9. No significant relationship existed between the Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts course scores for the 1966 through the 1970 groups.

10. No significant relationship existed between the Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 groups.

Delimitations

The research was delimited to the 31 industrial arts teachers and supervisors from the Thai Comprehensive School Project who took the industrial arts course for their major field in the Graduate Diploma Program at The University of Alberta during the year 1966 through 1970. It was also delimited to 129 teachers and supervisors of the other academic areas in the same Project and the same years.

The study attempted to identify Thai industrial arts participants' success by comparing the Mean Final GPA in all industrial arts course scores, Mean Final TOEFL, Mean Final GPA of all related course scores, and Mean Final GPA in all course scores of the Graduate Diploma in Education as well as the other academic participants.

Non-standardized and standardized tests were used in this study.

Limitation

This study was restricted to the industrial arts program and the other academic areas arranged by The University of Alberta for all Thai participants involved in the Thai Comprehensive School Project. The time limitation of this study includes only the years of the Project, 1966 through 1970, that is, the academic years aided by the Canadian aid program.

Definition of Terms

Because the following terms will be used throughout this study, the following definitions have been formulated or adapted for them.

Industrial Arts. The definition for the term industrial arts given by the Ministry of Education of Thailand was found to be acceptable for this study. The Ministry defined industrial arts as:

. . . that part of the total program of education concerned with providing youth an opportunity to study about and use tools, materials and process of industrial technical fields.³

Comprehensive school. Miller's definition for the term comprehensive school was found to be acceptable for this study. According to his definition, a comprehensive school is:

. . . one which seeks to provide for all or almost all of the children of given localities a secondary education suited to their diverse aims, interests, abilities, and aptitudes.⁴

CIDA's aid program. The nearest definition of the financial aid program for educational purposes funded by the Canadian International Development Agency (CIDA) is that given by Walmsley who wrote:

. . . the CIDA's aid program is responsive that is, it is geared primarily to responding to requests received from individual governments. Gradually, CIDA is attempting to cooperate more closely with developing countries in identifying and planning projects to fit in with those countries needs. Included in the capability, of course, are the available university resources.⁵

SUMMARY

Because of needs for the development of human resources and manpower of Thailand since 1963, various studies, reports, conferences, and assessments have been conducted. One of the important recommendations advised that an industrial arts program should be introduced into the curriculum of the secondary school level and organized at this level into a comprehensive school type. The same recommendation was further

emphasized by the Second National and Economic Development Plan in 1967.

To reorganize the secondary school into comprehensive school, Thailand through the Ministry of Education had received assistance from the Government of Canada through the Canadian International Development Agency in forms of commodities, advisory teams, and a loan. Canadian advisors worked closely with Thai educators and selected the twenty secondary schools located in all parts of Thailand to be involved in the Comprehensive School Project. The thirty-one industrial arts teachers and supervisors together with 129 participants of the other academic areas were trained by The University of Alberta. They were considered as key personnel in the implementation of the twenty comprehensive schools.

The problem of this study was to identify the affects of the training program on the thirty-one industrial arts participants arranged by The University of Alberta in order to provide some information that will be useful to the Thai students who are now being or will be studying abroad, the Thai Government, and The University of Alberta.

The objectives of the study were to determine if some significant differences or relationship existed between the training program on the thirty-one industrial arts participants in the major industrial arts area, and their related areas as well as the other academic area groups.

Ten hypotheses were assumed to be tested, and the thirty-one Thai industrial arts participants and 129 other academic area participants were the only subjects included in this study which ran from 1966 through 1970.

CHAPTER REFERENCES

¹Educational Planning Office, Secondary Education, Manpower and Educational Planning in Thailand. (Bangkok: Ministry of Education, 1966), pp. 14-17.

²National Development Board, Summary of the Second five-years Plans (1967-1971). (Bangkok: Office of Prime Minister, 1966), p. 33.

³Department of Secondary Education, Report of Comprehensive School No. 1. (Bangkok: Ministry of Education, 1969), p. 33 (Mimeographed).

⁴T. W. G. Miller, Values in the Comprehensive School, Educational Monographs No. 5. (Alva: University of Birmingham Institute of Education, 1961), p. 17.

⁵N. Walmsley, Canadian Universities and International Development Agency. (Ottawa 4: 1970), p. 226 (Mimeographed).

CHAPTER II

REVIEW OF RELATED LITERATURE

A Historical Overview of the Industrial Arts Program in Secondary Education in Thailand

Many demands in society have far reaching implications for educational systems designed to serve a nation. For example, industrialization, automation, and resultant job displacement, along with the concomitant requirements for increasing numbers of scientists, engineers, and higher skilled technicians obviously place increased and changing demands on schools. This change phenomenon is especially true in developing nations such as Thailand. The current migration of rural farm families to Thailand's urban centers is creating new demands for changing educational programs. Regional pockets of poverty, with the employed being largely the poorly educated, have made clear the need for a different kind of educational curriculum. As a result, a program of comprehensive and diversified industrial arts education was chosen to be carried to the secondary schools of Thailand.

History of the Industrial Arts Program in Secondary Education in Thailand

The present industrial arts program has been brought to secondary schools level in Thailand since 1951. Before mentioning this, however, it should summarize how industrial arts was related to pre-vocational education or vocational

education of the Thai people during the prior period. From the beginning of history of Thailand, from Sukothai period (1257-1377), through the Ayudhya period (1377-1767), the Thonburi period (1767-1782), up to the beginning of the first stage of the Ratanakosin period (1782-1868), there were few significant instances of involvement in educational systems. Historical evidence through this six-hundred-year period shows that the purpose of education at that time was to provide moral and religious instruction and was centered in temples like the monastic and cathedral schools of Medieval Europe. The subject matter was limited. Vocational training was carried on in the family units. Skills and knowledge relating to the use of tools and materials were transmitted from father to son and mother to daughter. Young boys were taught how to farm, hunt, fight, and develop some of the basic skills in handicrafts. Girls were also given training in farming as well as domestic skills. Education was primarily the responsibility of parents and the religious leaders (or Buddhist priests).

The first modern school was established by King Chulalongkorn (Rama V.) on the palace grounds in 1871. In 1887, the Department of Education was established and five years later it became a Ministry of Education. The educational plans from 1871 through 1931 were intended to train boys for office work or civil service. The year 1932 marked the beginning of a new political as well as educational system. Increased emphasis was placed on meeting the needs.

of the individual even though it was still emphasized that education should meet social needs that were in harmony with the economic and the political system of the country. The 1936 National Scheme of Education focused on a rapid expansion of elementary education and private schools. A considerable amount of the budget was spent on a literacy campaign and little was left over for developing secondary education. Vocational schools at the lower levels (grade 5-7 and 8-10) were established because the government wanted to discourage the students from academic study and to encourage them to train for some vocational program.

From the beginning, vocational schools at the lower level were not popular. It was believed that only the weaker students went to vocational schools. Poor achievement in academic subjects, lack of proper facilities, and untrained teachers gave support to this popular belief, and enrollments in vocational schools declined. A sudden change came when the Ministry of Education adopted a policy of employing the graduates of vocational schools as teachers in elementary schools. Almost immediately, all lower vocational schools in the provinces were filled to capacity. The enrollments dropped drastically again a few years later when the Ministry of Education stopped recruiting these graduates to teach in the elementary schools.

In 1951, the Scheme of Education was revised. The most important feature of the revised scheme divided the lower secondary grades into three streams: the academic

stream for children who wanted to prepare for higher learning; the vocational stream for those who wanted to seek employment easier; and a general stream for those who did not want to go beyond grade 7. On the upper level, there are two streams: academic and vocational. From grade 10 on, the grades of the higher vocational schools were organized parallel to the two pre-university classes. Because opportunities for work in the fields of industry and commerce perhaps were so limited and the prestige of white-collar jobs was so high, fewer students continued to enter the vocational stream and the majority of the secondary school students still strived to enter the academic stream, especially on the lower secondary level.

In the same year of the scheme, efforts to encourage development of vocational education at the secondary school level in Thailand were launched with funds provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO). A pilot School Project was established under UNESCO's sponsorship. The first experimental school was in Chachoengsao province and the second was extended to Choburi province in 1954. Both schools soon reverted to their formal general academic status following the withdrawal of the UNESCO support in 1955. The experiment was generally considered to have failed for the following reasons: (1) lack of clear-cut goals, (2) poor/or inadequate planning by UNESCO and Thai Ministry of Education officials, (3) poorly trained staff, (4) lack of appropriate equipment, and (5) lack of support from Thai Government.¹

The imbalance of enrollment caused much concern for Thai educated authorities. Only a very low percentage of students were able to continue their academic education beyond the secondary school level. During that time the country's needs were for semi-skilled craftsmen, while the capacity of higher education was also limited. By 1960, a new National Scheme of Education came into being. The new scheme put particular stress upon meeting the needs of the individual and of society, and introduced some significant curricular experimentation at the secondary school level. The most novel change in the secondary schools combined both academic and pre-vocational subjects, namely industrial arts. This change introduced students the intension to meet the needs mainly of those who would not be continuing their education in a college or university, but not as a barrier to such higher education. One set of common objectives or guiding principles was adopted for both the lower and upper levels of vocational and general secondary schools. These objectives are as follows:

1. To provide general education appropriate for the majority of the pupils and the conditions of society; and to provide special programs to meet the abilities and interests of each individual.
2. To inculcate in pupils physical and mental health habits, and concern for the public health program.
3. To develop desirable citizenship attitudes and abilities in order to live and work effectively with others.

4. To help pupils acquire knowledge and skills sufficient to earn a living, or to necessary foundations either for vocational training or for higher education.²

The first permanent comprehensive secondary school in Thailand was established at Suranari Vidhya Girls School at Nakorn Rajasima province in the year 1960. All students from grade 8 to 10 had been encouraged to take some course work in practical arts or industrial arts. A high percentage of students in academic stream took such pre-vocational courses as agriculture, business, home economics, food catering, dressmaking, flower-arranging, needle-work, pottery weaving, and basic electricity. Perhaps the most significant consequences such a school had on its students were to bridge the chasm that existed between academic and vocational studies. But the comprehensive high school at that time still represented only a small part of the secondary school picture. It is then a promising experimental practice rather than a wide-spread reality.

The success of an institution in which girls could pursue the course which fit their own interests and abilities paved the way for the establishment of a second comprehensive school in 1963. That school was Rajasima Vidhyalai, a boys' secondary school, also in Nakorn Rajasima province (this school was incorporated into Comprehensive School Project No. 1 in its first phase in 1967). These two comprehensive schools stand as important milestones in Thai education and their successes have been measurable. In these schools,

dropout problems decreased steadily as more students pursued courses suited to their own aptitudes and inclinations. Attitudes towards vocational education or blue-collar occupations have been made more positive as indicated by the number of students, including many who are academically talented, taking practical arts and vocational courses. Some of these students have gone on to further their education successfully in vocational and technical schools and many have found contented lives working in various occupations. The apparent key to this success is a flexible curriculum which permits students to explore many courses in order to find the one best suited to them.

A need for broadly educated secondary graduates is demanded by national plans for development. Various studies have been conducted and projects planned to meet these demands. The most significant recent study of Thai education in which a more extensive industrial arts program was brought to schools was the preliminary Assessment of Education and Human Resources in Thailand conducted by a joint Thai-USOM study group in 1963. The major recommendation of the study was to focus on a more comprehensive study of the secondary educational school level.

The Committee for the Comprehensive Secondary School was established in 1965 by the Ministry of Education. After several sessions and careful studies, the Committee recommended the expansion of the comprehensive schools along the same lines as the two comprehensive schools in Nakorn Rajasima.

province. This recommendation was seconded by a Research Committee on Secondary Education and Human Resource Development which had made a thorough study of educational needs in Thailand. Thus, the expansion of the comprehensive schools became a national policy. A Comprehensive School Project Division was established as early as October 1965 within the Department of Secondary Education, and by 1966, Canadian assistance was accepted in principle. The Comprehensive School Project No. 1 which was composed of 20 secondary schools selected to be comprehensive school type received formal Cabinet approval in April, 1967.

The original Project was designed to run from 1966 to 1969, but delays, largely of a financial nature, resulted in the Project being extended until 1971. Under Canadian aid program from the beginning of the Comprehensive School Project, 160 Thai teachers and supervisors including 31 industrial arts teams were sent to the University of Alberta, a Canadian university for pursuing a graduate Diploma in Education involving in the Comprehensive School Project. Two teams of Canadian advisers have worked closely for four years with the Project. The 20 comprehensive schools are now fully operational and Thai teachers and supervisors who have finished their education from The University of Alberta are working in these schools or in the office of the Comprehensive School Project. The courses offered in Thailand's comprehensive schools include mostly: (1) more elective courses, (2) pre-vocational and economic courses, (3) one or more areas

of vocational education, (4) co-education in most cases, and (5) guidance services.

Another means of assistance to the industrial arts program in secondary schools of Thailand has been UNICEF (the United Nations International Children's Emergency Fund) since 1963. Although the majority of UNICEF donations are focused on the Public Welfare Department, the Ministry of Interior and the Ministry of Public Health, UNICEF has partially taken part in donating special supplies and equipment for the teaching of home economics, industrial arts, and agriculture techniques in general district and provincial secondary schools. UNICEF has also provided aid in the forms of training courses for industrial arts secondary school teachers, vehicles to industrial arts supervisors of the Department of Secondary Education as well as for repairing the industrial arts equipment and followup of the results of the teaching and learning of the industrial arts program in these schools. More than sixty secondary schools and more than 200 industrial arts teachers have been improved as a result of UNICEF assistance.

The industrial arts program is now carried out in grade 8 through grade 10, and the subject areas taught at this level are woodwork metal work, power-mechanics, electricity and electronics, ceramics, and graphic arts. The program is not ready to expand through grade 11 and 12 at this time, however, because the problem is compounded by the fact that students have many avenues into which they can move after

leaving grade 10. These avenues include vocational schools, technical institutes, teacher training colleges, business colleges, and nursing institutions. Normally the students who proceed to grade 11 and grade 12 in comprehensive schools are pursuing an academic program. They all expect to write the national grade 12 final examinations. Many will also write university entrance examinations. As a result, those choosing an industrial arts program from grade 11 to grade 12 are presently quite limited.

The Alberta Training Program for Participants in the
Thai Comprehensive School Project

In accordance with the terms of the Feasibility Study in Relation to a Comprehensive School Project in Thailand of March, 1966,³ the agreement between the Government of Canada and the Government of Thailand called for the preparation of supervisors, administrators, and teachers of the Department of the Secondary Education with chief responsibility for organizing, planning, supervising, and administering the industrial arts, guidance, counseling programs, and the academic aspects of these programs in the comprehensive schools at a Canadian university from 1966 through 1970. There were 160 participants who attended and finished the Graduate Diploma in Education from The University of Alberta. They were divided into five groups: 34 participants in the 1966 group, 37 in 1967, 39 in 1968, 25 in 1969, and 25 in the 1970 group.

The goal of the Alberta Training Program was

composed of three elements; flexibility in programming, a blend of theory and practice, and a pre-session orientation and language program prior to the commencement of studies in September of each year of the training program.⁴ To attain and implement this goal, all Thai participants who worked on the Graduate Diploma Program in Education were required to take the common core courses, Education Administration 504, Industrial Arts Experience, and at least one course related to their areas of teaching specialization or future duties in Thailand. The participants were also required to participate in social activities and practicum in Alberta schools and took part in a summer language program commencing early in July and ending shortly before Fall registration.

Common Core Courses

Education administration 504: Seminar on the comprehensive high school. The contents of this course include the philosophy of the comprehensive school, its characteristics and problems, physical facilities, the uses of educational techniques in instruction, and its organization. Education, with special reference to cultural differentiation, organizations and their requirements, organizational behavior and theories of innovation was emphasized. Attention was paid to the needs of the individual student, society, aspects of groups as well as the roles of teachers, administrators and supervisors and place of

community in the operation of a comprehensive school. The contents of this course was equivalent to three full courses at The University of Alberta. Theoretical lecture, presentation, and discussion of various topics was conducted by the Training Director, Liaison Professor, and the participants.

Industrial arts experience. The Industrial Arts Experience course was an excellent opportunity for Thai students to become acquainted with the new and modern industrial arts equipment like they would be using in the comprehensive schools. This experience was required in order to create an awareness of the impact of modern technology upon education and upon life in the modern world. During the period of the 1966 and 1967 groups at the University of Alberta, the multiple activities laboratory of industrial arts was provided as part of Education Administration 504. The last three groups were separated to study Vocational Education 361 which dealt with the materials, tools, processes, and technology of a productive society.

Related courses. The related courses were arranged for the Thai participants to fulfill the requirements of their Graduate Diploma Program in Education. At least one full-course or two half-courses were related to the participant's original area of specialization or to one's possible future responsibility to the Comprehensive School Project in Thailand. In the 1968 and the 1969 classes, for example, over thirty different related courses were taken by the Project's students, who attended classes in their areas of study along with

Canadian students in the same field.

Social Activities

Social activities provided an opportunity for Thai students to participate in social events with Canadian groups. The university sponsored several such events each year of the Training Program. Many professors and Summer Language Program instructors invited the Thai students to their homes. In addition, the Thai students provided each year the magnificent "Thai Night" on December 5th. The date of the celebration of the Thai King's birthday. Such activities were conducted so that Thai students would not miss their homes, and thus, reach a higher level of achievement in the program.

The Practicum

All Thai students visited the junior high schools, composite senior high schools, and higher Vocational schools in Edmonton and in towns of the Province of Alberta. The objectives of the program were for the participants to get familiar with all aspects and systematic behavior of those schools. In addition, many specialized experiences were provided, such as meeting with supervisors of special subjects, attendance at conferences, and instruction in such things as the use of audio-visual aids, the time tabling of large schools, and the handling of science equipment. The practicum was included within Education Administration 504, so that discussion and oral and written reports on each

practicum were required.

Summer Language Program

English was arranged to prepare the participants for their University studies. The Thai students usually commenced this instruction early in July and ended before Fall registration. The program spent basically two hours per day in the language laboratory experiences, plus four hours per day in small group instruction. The latter was conducted by teachers drawn from Edmonton Public Schools or Separate Schools. Due to lack of time, the participants of the 1966 group did not have a Summer Language Program, but commenced their studies shortly after arriving in September. The participants also visited language-stimulating settings in the community, then returned to the classrooms for discussion and oral and written expression, focusing on their visits.

The Development of Industrial Arts Programs in the Comprehensive Schools of Thailand

The concepts of industrial arts development. The rapid change in the mode of living in the space age, such as the impact of new technology, the advance of automation, the increases in technical knowledge, and the obsolescence of skills have forced the nations to become interested in developing their educational systems. These nations want every growing youngster to have first-hand experience in order to prepare himself for getting along with the world of

technology. Presently, every growing youngster needs experience which will give him confidence, understanding, and the ability to plan his future. He needs an opportunity to explore himself and the physical world around him and also needs to learn about the industrial society in which he will work and live. The role and function of industrial arts in the modern system of education today is to help both youngsters and nations fulfill their educational requirements.

Industrial arts education is a relatively recent innovation to the formal curricula of the secondary school level, but the human activities which constitute industrial arts have been a part of education processes since man came out of the caves. Therefore, industrial arts activities are an integral part of family and community living as well as an integral part of the general educational curriculum of the secondary school.

The entire program of industrial arts is predicated upon direct involvement with materials, tools, machinery and the processes. Industrial arts has certain pre-vocational values, but its prime mission at present is not to provide vocational specialization for students. The function is to assist students in exploring and preparing for job entry upon graduation. Industrial arts can upgrade and enrich the educational program of all students in the total school program. The main emphasis of activities in industrial arts focuses on laboratory centered career experience with inter-related activities in mathematics, science, and English.

Ziel says that one of the most important functions of industrial arts is to "reinforce academic learning, synthesize the educational environment, interpret productive society, and provide exploration and experiences to guide future career selection."⁵

The program development. Industrial arts education has been taught in secondary schools in Thailand for many years, but the program was not popular among students and parents and especially was then lacked of supporting by the Government. After the Canadian aid program took place in 1967, the innovation of such kinds of education has been improved. The organizational pattern has been changed and modified and the program has been planned and equipped to facilitate the teaching and learning of industrial arts subject matter.

The organization of the instructional program has been improved and a systematic layout of the physical plant has been provided for effectiveness. The program is also aimed at utilizing the students based upon their participation. The operation of an adequate safety program and the maintenance of student records is also included in the program.

The industrial arts workshops, both general and unit, are provided for the number of students in each of twenty comprehensive schools. Hand and power tools, equipment, instructional materials, and supplies are available in each workshop. There are rooms for storage

and for special individual or group special activities. All effective physical facilities are also arranged to provide for flexibility or adaptability to technical or instructional change, for safety, and for the health of students.

Industrial arts general shop is offered to students at the beginning of grade 8, and it is expected that the program will occupy a minimum of two periods of instruction per week for the academic year. The needs of advanced higher students are more complicated because they must choose suitable pre-vocational courses in grade 9 as these are pre-requisites to more intensive courses in grade 10. Industrial arts courses in grade 8 have a duration of 4 periods per week for one term. The time allotment of 4 periods per week assumes that a student will take one course in each of the three terms (one year) while 8 periods per week mean two courses per term. In grade 10, the courses are 8 periods in length for the entire year. Students in the vocational program may take one course while those in trade or terminal may take two, because there are a vocational, trade, and terminal program giving them as much time as possible to explore in grade 9 and to develop skills in grade 10.

Another program development is the industrial arts in-service seminars and it is a continuing need for industrial arts teachers. The program is designed to acquaint them with the new teaching equipment, its use, care and maintenance; to demonstrate safe and acceptable teaching methods and procedures; with the prevailing scarcity of text books in Thailand,

to compile handbooks job and information sheets; and through practice, gain as much as practical experience and skill as time will permit.

SUMMARY

Nearly 700 years from the beginning of Thai history (1257-1950), there was no evidence of the introduction of industrial arts or pre-vocational education into school. However, under the 1951 Scheme of Education, UNESCO brought pre-vocational education to one secondary school, and extended such program to a second school in 1954. UNESCO's sponsorship was then withdrawn because of inadequate planning and lack of support from Thai Government.

The impact of modern technology and the demand for middle-level skilled workers were the influences most pertinent to the application of industrial arts in secondary education in Thailand. By 1960, a new National Scheme of Education aimed to organize education to meet the needs of the individual and the Thai society. The first experimental comprehensive school was established and followed by a second school in the same Nakorn Rajasima province. The successes of the introducing industrial arts programs into the two experimental comprehensive schools were demanded by the National Plan for development. An important study conducted by a joint Thai-USOM study group in 1963 named the Preliminary Assessment of Education and Human Resources in Thailand focused on a more comprehensive study of the

secondary educational level.

In 1965, the Ministry of Education established the committee of the Comprehensive Secondary School. The committee proposed the expansion of the comprehensive schools which consequently became a national policy. An office of the Division of the Comprehensive School Project was established in October 1965, and twenty secondary schools located in different parts of Thailand were selected to become comprehensive schools under the Canadian aid program. Two teams of Canadian advisors had worked closely for four years with the Project, while 160 Thai teachers and supervisors were trained in a Graduate Diploma in Education Program by The University of Alberta from 1966 through 1970. These participants were finished their education and are now working as key personnel in the twenty comprehensive schools and in the Project's office. The Alberta Training Program was composed of three elements: flexibility in programming, a blend of theory and practice, and a pre-session orientation.

Industrial arts education for secondary schools in Thailand prepares students to meet the needs of the individual and the Thai society, develops attitudes and abilities, and promotes industrious habits, perserverance and training in manual skills.

At present, the twenty comprehensive schools are in full operation. The industrial arts organization, physical facilities, and the instructional offering have been improved, developed, and modified. The industrial arts teachers are

continually receiving in-service training under the
Comprehensive School Project.

CHAPTER REFERENCES

¹Educational Planning Office, The Diffusion of Educational Innovations in the Government Secondary School of Thailand. (Bangkok: Ministry of Education, 1966), p. 18.

²Ruang Chareonchai, Industrial Arts in the Secondary Schools of Thailand. (Unpublished Ph.D. Dissertation: The Ohio State University, 1963), p. 121.

³The Department of Secondary Education, The Feasibility Study in Relation to a Comprehensive School Project in Thailand. (Bangkok: The Comprehensive School Project, 1967) pp. 1-25 (Mimeographed).

⁴Faculty of Education, Review of the Training Program: Thailand Comprehensive School Project, Second Report 1969-72). (Edmonton: The University of Alberta, 1972), pp. 15-20.

⁵Henry R. Ziel, Man-Science-Technology, An Educational Program. (Edmonton: I.D.B. Press, 1971), p. 40.

CHAPTER III

METHODOLOGY

The methodology concerned itself with correct procedures and techniques which have been described under: (1) the sample, (2) instrumentation, (3) collection of data, and (4) statistical treatment.

The Sample

The sample in this study consisted of 31 Thai students who had been studying the major field of industrial arts during Graduate Diploma Program at The University of Alberta from 1966 through 1970. There were 6 persons in the 1966 group, 8 in the 1967 group, 7 in the 1968 group, 2 in the 1969 group, and 8 in the 1970 group. All were selected from teachers and supervisors of the Department of Secondary Education, Ministry of Education of Thailand by a selection committee composed of representatives from both the Department of Secondary Education and The University of Alberta. They were all men, and Buddhists ranging in age from 27 to 40.

A sample item from this study was excluded if the information of records needed for a particular purpose in the investigation was missing.

Some characteristics of the sample were:

Age. Among the categories of age groups, there were

11 men between the ages of 26 through 30, 16 men between the ages of 31 through 35, and 4 men between the ages of 36 through 40.

Previous background of education. It was found that 20 men held the Diploma of Industrial Arts or equivalent from various Technical Institutes in Thailand and 11 men had no background in Industrial Arts. They had all finished a Bachelor Degree or equivalent and one held the Master of Science Degree.

Instrumentation

The instrumentation used in this study was:

1. The final GPA in all courses of Graduate Diploma in Education of the industrial arts participants and the total participants for the 1966 through 1970 groups.
2. The grades of all industrial arts courses of the industrial arts participants for the 1966 through 1970 groups.
3. The Final TOEFL scores of the industrial arts participants and the total participants for the 1967 through 1970 groups.
4. The grades of Final Vocational Education 361 course of the industrial arts participants and the other academic participants for the 1968 through 1970 groups.
5. The grades of the Final Related courses of the industrial arts participants for the 1966 through 1970 groups.

TABLE 1

Distribution of Industrial Arts Participants
by Number, Age, and Previous Background
in Industrial Arts

Group	N	Age			Previous Background in Industrial Arts	
		25- 30	31- 35	36- 40	IA-Background	Non-IA Background
1966	6	5	-	1	4	2
1967	8	3	5	-	1	7
1968	7	-	4	3	5	2
1969	2	-	2	-	2	-
1970	8	3	5	-	8	-
Total	31	11	16	4	20	11

6. The number of the industrial arts participants who have had industrial arts background and non-industrial arts background for the 1966 through 1970 groups.

The Final GPA in all course scores of Graduate Diploma in Education was composed of the Grade in Educational Administration 504, Vocational Education 361 (for the 1968 through 1970 groups), and other Related courses.

The Final Industrial Arts course scores were composed of the grades in Educational Industrial Arts 589, 591, 260, and 203, and Vocational Education 361.

The Final TOEFL scores were derived from the scores of the last test made by all Thai participants for the 1967 through 1970 groups and administered by Dr. L. G. Gue, the Training Director of Thai Comprehensive School Project at The University of Alberta.

The Final Related course scores were composed of the grades in Educational Administration 504 and the other courses selected by each individual of the industrial arts participants.

Collection of Data

The data in this study were the Final Grade Point Average (GPA0 of the Graduate Diploma Program in Education) taken by all Thai participants for the 1966 through 1970 groups, the grades in industrial arts and related courses taken by industrial arts participants for the 1966 through 1970 groups, the scores of the Final TOEFL test taken by all

TABLE 2

Distribution of Industrial Arts Participants by their Mean Final GPA
in all Course Scores of the Graduate Diploma in Education,
and Number of Men who took Industrial Arts Courses,
Related Courses, and TOEFL Test

Group	N	Mean Final GPA	Number of Industrial Arts Courses					Number of Related Courses (Ed. Admin.)					TOEFL Test
			1A	1A	1A	1A	Voc.	504	525	561	563	581	
			203	260	589	591	361						
1966	6	5.75	-	-	6	6	-	6	-	-	-	-	-
1967	8	6.07	6	-	8	8	-	8	1	-	-	1	8
1968	7	5.49	1	-	7	7	7	7	1	1	1	-	7
1969	2	6.00	-	2	-	-	2	2	-	-	-	-	2
1970	8	5.93	-	8	-	-	8	8	1	-	-	-	8
Total	31	5.85	7	10	21	21	17	31	3	1	1	1	25

Thai participants for the 1967 through 1970 groups, and the grades of Vocational Education 361 taken by all participants for the 1968 through 1970 groups.

All Final GPA, grades and score were obtained from records of the Comprehensive School Project of Thailand with some demographic information such as age and previous background from other institutions of industrial arts participants at The University of Alberta.

Statistical Treatment

The following statistical designs were used to treat the research data.

t-test analysis. The t-test was used to determine whether there existed a significant difference among the finding of the following data:

1. The t-test between the Mean Final GPA in all industrial arts course scores of all industrial arts participants groups and the Mean Final GPA in all course scores of the Graduate Diploma in Education of the total participants for the 1966 through 1970 groups.

2. The t-test in Mean Final scores of Vocational Education 361 between the industrial arts participants and all other academic participants for the 1968 and 1970 groups.

3. The t-test in Mean Final Scores of the TOEFL test between the industrial arts participants and the total participants for the 1966 through 1970 groups.

4. The t-test in Mean Final GPA of all course scores of the Graduate Diploma in Education between all industrial arts participants and the total participants by years for the 1966, 1967, 1968, and 1970 groups.

5. The t-test in Mean Final GPA of all industrial arts participant course scores between background and non-background in industrial arts for the 1966 through 1970 groups.

6. The t-test in Mean Final GPA of all related course scores between background and non-background industrial arts participants for the 1966 through 1970 groups.

The .05 level of the probability for each t-test was accepted as indicating a statistically significant difference.

Pearson's Product-moment Coefficient of Correlation.

This test was used to compute the relatensess coefficients among various Final GPA and scores of the instrumentation. The following coefficients were calculated and arranged in tables:

1. The correlation coefficients between the Mean Final GPA in all industrial arts course scores and the Mean Final GPA in all related course scores of the industrial arts participants by years and by the total group for the 1966, 1967, 1968, and 1970 groups.

2. The correlation coefficient between the Mean Final GPA in all industrial arts course scores of all industrial arts participants and their Mean Final TOEFL Test scores for

the 1967 through 1970 groups.

3. The correlation coefficient between the Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts course scores for the 1966 through 1970 groups.

4. The correlation coefficient between the Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 group.

Each correlation was tested for statistical significance at the 0.05 level.

Mean. This statistic was used to describe the central tendency of a distribution of the measures. Means used: GPA in all course scores of the Graduate Diploma in Education for industrial arts participants and the total group, GPA in all industrial arts and all related course scores of the industrial arts participants, the grades of Vocational Education 361 for the industrial arts participants and the other academic area groups, and the scores of the TOEFL test of the industrial arts participants and the total groups.

Grade point average (GPA). This average was used to describe the academic achievement of industrial arts participants and related courses computed on a nine-point grading system.

SUMMARY

The methodology used in this study included the sample, instrumentation, collection of data, and statistical treatment.

The 31 Thai industrial arts participants and 129 other academic participants involved in the Thai Comprehensive School Project as well as the industrial arts program at The University of Alberta were the sample of this study. Some characteristics of the sample were provided in Table 2.

The instrumentation used in the study was the final GPA in all course scores of the Graduate Diploma in Education; the grades of in all industrial arts courses, in all related courses, and in Vocational Education 361 course; the scores of Final TOEFL, and the number of industrial arts background and non-background participants were provided on the Table 2.

All essential data used in this study were obtained from records of the office of the Thai Comprehensive School Project at The University of Alberta. The t-test, the Pearson's Product-moment Coefficient of Correlation, Means, and Grade-Point Average were used for statistical purposes.

CHAPTER IV

FINDINGS

This chapter presents the findings of the study dealing with the comparisons of the relationships among the following instrumentations:

1. The Mean Final GPA in all industrial arts course scores of all industrial arts participants and the Mean Final GPA in all course scores of the Graduate Diploma in Education of the total participants for 1966 through 1970 groups.
2. The Mean Final Scores in Vocational Education 361 of the industrial arts participants and the Mean Final scores in the same course taken by the other academic participants for the 1968 and the 1970 groups.
3. The Mean Final Scores of TOEFL test between all industrial arts participants and the total participants for the 1967 through 1970 groups.
4. The Mean Final GPA in all course scores of the Graduate Diploma in Education between all industrial arts participants and the total participants for the 1966, 1967, 1968, and 1970 groups.
5. The Mean Final GPA in all industrial arts course scores between industrial arts and non-industrial arts background participants for the 1966 through 1970 groups.
6. The Mean Final GPA in all related course scores between industrial arts and non-industrial arts background

participants for the 1966 through 1970 groups.

7. The Mean Final GPA in all industrial arts course scores of industrial arts participants and their Mean Final GPA in all related course scores for the 1966, 1967, 1968, and the 1970 groups.

8. The Mean Final GPA in all industrial arts course scores of all industrial arts participants and their Mean Final TOEFL test scores for the 1966 through 1970 groups.

9. The Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts course scores for the 1966 through 1970 groups.

10. The Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 groups.

Three null hypotheses and three directional hypotheses were computed by t-test analysis, and three null hypotheses and one directional hypothesis were computed by Pearson's Product-moment Coefficient of Correlation.

GPA in All Industrial Arts Course Scores and GPA in
all Course Scores of Graduate Diploma in Education

Statement of hypothesis 1. "The Mean Final GPA in all industrial arts course scores of all industrial arts participants was not significantly different than the Mean Final GPA in all course scores of Graduate Diploma in Education of the total participants for the 1966 through 1970 groups."

TABLE 3

The t-Test between Mean Final GPA in all Industrial Arts Course Scores of all Industrial Arts Participants and Mean Final GPA in all Course Scores of the Graduate Diploma in Education of the Total Participants

Group	IA Participants		Total Participants		t	Level of the Probability
	N	Mean Final GPA in industrial Arts Course Scores	N	Mean Final GPA in all Course Scores of Graduate Diploma in Education		
1966-1970	31	5.91	160	6.55	3.566	0.0002

Discussion of Results

The t-value of 3.566 corresponds to a probability of 0.0002. 0.0002 is less than the .05 level of significance and was considered to be highly significant. Therefore, the hypothesis was rejected.

Scores in Vocational Education 361

Statement of hypotheses 2. "The Mean Final Scores in Vocational Education 361 of the industrial arts participants was significantly higher than the Mean Final Scores in the same course of the other academic participants for the 1968 and 1970 groups."

Discussion of Results

The value of t-test of 1.825 for the 1968 group was significant at the 0.038 level, while the value of t-test of 3.766 for the 1970 group was significant at the 0.001 level, and the value of t-test of 1.473 for the total group was significant at the 0.073 level.

The level of the probability of 0.038 which was lower than the 0.05 level for the 1968 group was considered very significant, while the level of the probability of 0.001 which was much lower than the 0.05 level for the 1970 group was highly significant. The results of the two groups caused the hypothesis to be accepted.

The value of the probability of 0.073 for the total group exceeded a given value of the 0.05 level, so that the result was not significant and therefore, the hypothesis was

TABLE 4

The t-Test between Mean Final Scores in Vocational Education 361 of all Industrial Arts Participants and Mean Final Scores in the same Course of the other Participants

Group	IA Participants		Other Participants		t	Level of the Probability
	N	Mean Final Scores in Ed.Voc.361	N	Mean Final Scores in Ed.Voc.361		
1968	7	7.86	31	7.48	1.825	0.038
1970	8	6.88	17	6.06	3.786	0.001
Total	15	7.33	48	6.98	1.473	0.073

rejected.

Scores in TOEFL Test

Statement of hypothesis 3. "No significant difference existed in Mean Final Scores of TOEFL test between all industrial arts participants and the total participants for the 1967 through 1970 groups."

Discussion of Results

Since the t-test of -3.010 was significant at the 0.002 level which was much less than the 0.05 level, it indicated that the result was highly significant. Therefore, the hypothesis was rejected.

GPA in all Course Scores of Graduate Diploma in Education

Statement of hypothesis 4. "No significant difference existed in the Mean Final GPA in all course scores of Graduate Diploma in Education between the industrial arts and the total participants for the 1966, 1967, 1968, and 1970 groups."

Discussion of Results

The t-test value of -0.605 for the 1966 group was significant at the 0.058 level. The probability of 0.058 was slightly greater than the given value of the 0.05 level, therefore, it can be considered significant and the hypothesis was rejected.

The t-test value of -.127 for the 1967 group was significant at the 0.449 level. The probability of 0.449

TABLE 5

The t-Test in Mean Final Scores of TOEFL Test between all Industrial Arts and the Total Participants

Group	<u>IA Participants</u>		<u>Total Participants</u>		t	Level of the Pro- bability
	N	Mean Final Scores of TOEFL Test	N	Mean Final Scores of TOEFL Test		
1967- 1970	25	371.60	136	434.20	-3.010	0.002

TABLE 6

The t-Test of Mean Final GPA in all Course Scores of Graduate Diploma in Education between the Industrial Arts and the Total Participants

Group	IA Participants		Total Participants		t	Level of the Probability
	N	Mean Final GPA in all Course Scores of Graduate Diploma in Education	N	Mean Final GPA in all Course Scores of Graduate Diploma in Education		
1966	6	5.75	34	6.51	-1.605	0.058
1967	8	6.32	37	6.35	-0.127	0.449
1968	7	5.49	39	6.62	-2.306	0.013
1970	8	5.93	25	6.42	-1.400	0.086
Total	29	5.89	135	6.48	-3.004	0.002

exceeded the 0.05 level, therefore it indicated non-significance and the hypothesis was accepted.

The t-test value of -2.306 for the 1968 group was significant at the 0.013 level. The probability of 0.013 was lower than the 0.05 level, therefore it indicated a highly significant relationship and the hypothesis was rejected.

The t-test value of -1.400 for the 1970 group was significant at the 0.086 level which was higher than the 0.05 level and indicated non-significance. Therefore, the hypothesis was accepted.

The t-test value of -3.004 for the total group was significant at 0.002 level which was much lower than the 0.05 level and indicated high significance. Therefore, the hypothesis was rejected.

GPA in all Industrial Arts Course Scores

Statement of Hypothesis 5. "The Mean Final GPA in all industrial arts course scores of the industrial arts background participants was significantly higher than non-industrial arts background participants for the 1966 through 1970 groups."

Discussion of Hypothesis

Since the t-test of 0.040 was significant at the 0.484 level which was higher than the 0.05 level, it indicated non-significance and the hypothesis was rejected.

TABLE 7

The t-Test of Mean Final GPA in all Industrial Arts
Course Scores between Industrial Arts and
Non-Industrial Arts Background
Participants

Group	IA Background Participants		Non-IA Background Participants		t	Level of the Pro- bability
	N	Mean Final GPA in in- dustrial Arts Course Scores	N	Mean Final GPA in in- dustrial Arts Course Scores		
1966 - 1970	20	6.41	11	6.39	0.040	0.484

GPA in all Related Course Scores

Statement of hypothesis 6. "No significant difference in the Mean Final GPA of all related course scores between industrial arts background and non-industrial arts background participants for the 1966 through 1970 groups."

Discussion of Results

The t-test value of -2.240 was significant at the 0.016 level. The probability of 0.016 was much lower than a given value of the 0.05 level and therefore could be considered to be very significant. The hypothesis was rejected.

GPA in all Industrial Arts and all Related Course Scores

Statement of hypothesis 7. "The Mean Final GPA in all industrial arts course scores of the industrial arts participants was significantly higher than their Mean Final GPA of all related course scores for the 1966, 1967, 1968, and 1970 groups."

Discussion of Results

The value of the Correlation coefficient of 0.241 for the 1966 group was significant at the 0.646 level; the value of the correlation coefficient of 0.715 for the 1967 group was significant at 0.046; the value of the correlation coefficient of 0.519 for the 1968 group was significant at the 0.233 level; the value of the correlation coefficient of -0.037 for the 1968 group was significant at the 0.932 level; and the value of the correlation coefficient of

TABLE 8

The t-Test of the Mean Final GPA in all Related
Course Scores Between Industrial Arts and
Non-Industrial Arts Background
Participants

Group	IA Background Participants		Non-IA Background Participants		t	Level of the Pro- bability
	N	Mean Final GPA in all Related Course Scores	N	Mean Final GPA in all Related Course Scores		
1966- 1970	20	5.35	11	6.18	-2.240	0.016

TABLE 9

The Correlation Coefficients between Mean Final GPA in all Industrial Arts Course Scores and Mean Final GPA in all Related Course Scores of the Industrial Arts Participants

Group	N	Mean Final GPA in all IA Course Scores	Mean Final GPA in all Related Course Scores	r	Level of the Pro- bability
1966	6	5.00	6.00	0.241	0.646
1967	8	6.50	6.23	0.715	0.046
1968	7	6.71	4.79	0.519	0.233
1970	8	6.81	5.50	-0.037	0.932
Total	29	6.33	5.64	-0.011	0.956

-0.011 for the total group was significant at the 0.956 level.

Only the value of the probability of 0.046 (0.05) for the 1967 group was correlated and considered significant. This hypothesis was accepted. The calculated probability of the other groups and the total group exceeded a given value of significance (0.05), therefore, the hypothesis was rejected. Notice that the 1969 group is missing from the data because of a small number of the participants.

GPA in all Industrial Arts Course Scores and TOEFL Test Scores

Statement of hypothesis 8. "No significant relationship existed between Mean Final GPA in all industrial arts course scores of all industrial arts participants and their Mean Final TOEFL test scores for the 1967 through 1970 groups."

Discussion of Results

The value of the correlation coefficient of 0.254 from Table 10 was significant at the 0.219 level. The value of the probability was more than a given value of 0.05, therefore could not be considered significant and the hypothesis was accepted. Notice that the 1966 group was not included in the calculation because there was no TOEFL test provided for this group.

GPA in all Course Scores of Graduate Diploma in Education and GPA in all Industrial Arts Course Scores

Statement of hypothesis 9. "No significant

TABLE 10

The Correlation Coefficient between Mean Final GPA in all Industrial Arts Course Scores of all Industrial Arts Participants and their Mean Final Scores of TOEFL Test

Group	N	Mean Final GPA in all IA Course Scores	Mean Final Scores of TOEFL Test	r	Level of the Pro- bability
1967- 1970	25	5.94	317.52	0.254	0.219

TABLE 11

The Correlation Coefficient between Mean Final GPA in all Course Scores of the Graduate Diploma in Education of all Industrial Arts Participants and their Mean Final GPA in all Industrial Arts Course Scores

Group	N	Mean Final GPA in all Course Scores of Gra- duate Diploma in Education	Mean Final GPA in all Indus- trial Arts Course Scores	r	Level of the Pro- bability
1966- 1970	31	6.40	5.91	0.345	0.057

relationship existed between Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts course scores for the 1966 through 1970 groups."

Discussion of Results

From Table 9 it was found that the value of the correlation coefficient of 0.345 was significant at the 0.057 level. The value of the probability was almost nearly equal to a given value of 0.05 level, therefore, can be considered significant and the hypothesis was rejected.

GPA in all Course Scores of Graduate Diploma in Education and GPA in all Related Course Scores

Statement of hypothesis 10. "No significant relationship existed between Mean Final GPA in all course scores of the Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 groups."

Discussion of Results

The value of the correlation coefficient of 0.885 from Table 10 was significant at the 0.000 level. The value of the probability was lowest and indicated the highest significance. Therefore, the hypothesis was rejected.

Discussion of Findings

The tests found significant differences between relationships of the instrumentations as follows:

TABLE 12

The Correlation Coefficient between Mean Final GPA in all Course Scores of the Graduate Diploma in Education of all Industrial Arts Participants and their Mean Final GPA in all Related Course Scores

Group	N	Mean Final GPA in all Course Scores of Gra- duate Diploma in Education	Mean Final GPA in all Related Course Scores	r	Level of the Pro- bability
1966 - 1970	31	5.91	5.66	0.885	0.000

1. The Mean Final GPA in all industrial arts course scores of all industrial arts participants and the Mean Final GPA in all course scores of the Graduate Diploma in Education of the total participants for the 1966 through 1970 groups, and accepted hypothesis 1.
2. The Mean Final Scores in Vocational Education 361 of all industrial arts participants and the Mean Final scores in the same course taken by the other academic participants for the 1968 and 1970 groups, and accepted hypothesis 2.
3. The Mean Final Scores of TOEFL test between all industrial arts and the total participants for the 1967 through 1970 groups, but rejected hypothesis 3.
4. The Mean Final GPA in all course scores of Graduate Diploma in Education between industrial arts and the total participants for the 1966, 1968 and the total groups, but rejected hypothesis 4.
5. The Mean Final GPA in all related course scores between industrial arts and non-industrial arts background participants for the 1966 through 1970 groups, but rejected hypothesis 6.
6. The Mean Final GPA in all industrial arts course scores and the Mean Final GPA in all related course scores for the 1967 group, and accepted hypothesis 7.
7. The Mean Final GPA in all course scores of Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts

course scores for the 1966 through 1970 groups, and rejected hypothesis 9.

8. The Mean Final GPA in all course scores of Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 groups, but rejected hypothesis 10.

The examination of the means in their GPA of all industrial arts course scores, Graduate Diploma Program, TOEFL test, and related course scores showed mostly lower than the other group and especially the TOEFL test scores that were lower than they should be. These indicate that the industrial arts participants were weak in English which may have caused lower scores in the other subjects.

Non-significant differences were found to exist between the instrumentations as follows:

1. The Mean Final Scores in Vocational Education 361 between industrial arts participants and other academic participants who took the same course for the total group in 1966 through 1970, but rejected hypothesis 2.

2. The Mean Final GPA in all course scores of Graduate Diploma in Education between industrial arts and the total participants for the 1967 and 1970 groups, and accepted hypothesis 4.

3. The Mean Final GPA in all industrial arts course scores between industrial arts and non-industrial arts background participants for the 1966 through 1970 groups, but rejected hypothesis 5.

4. The Mean Final GPA in all industrial arts course scores and the Mean Final GPA in all related course scores of all industrial arts participants for the 1966, 1968, 1970, and the total groups, but rejected hypothesis 7.

5. The Mean Final GPA in all industrial arts course scores of all industrial arts participants and their Mean Final Scores of TOEFL test for the 1967 and 1970 groups, and accepted hypothesis 8.

All non-significant results indicate that the differences between the two types of each pair mentioned above were not sufficient to warrant the conclusion that one is better than the other. Considering the mean scores of Vocational Education course for the total group in Table 4, industrial arts courses in Tables 7, and 9, they indicate the higher scores of these subject areas, but the scores of all industrial arts courses for 1967 through 1970 groups provided in Table 10 are weak.

SUMMARY

The contents of this chapter determined the results of the lasting value of the Alberta Training Program as perceived by the industrial arts participants involved in the Comprehensive School Project. A t-test analysis and Pearson's Product-moment Correlation Coefficient analysis were used to carry out the relationship of the Mean Final GPA and the Mean Final Scores of various instrumentations, to determine whether there were some significant differences.

The results of the statistical computation indicated significantly and accepted three hypotheses, significantly but rejected seven hypotheses, non-significant and accepted three hypotheses, and non-significant but rejected six hypotheses. Discussion of the findings was mostly satisfactory in the achievement of industrial arts participants who were trained by The University of Alberta though they were likely weak in English.

CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter contains the summary of the study, conclusions, implications and recommendations for further study.

Summary

The problem. There is need for continual effort to provide manpower for educational planning for introducing industrial arts education into the curriculum of the secondary school level. Canadian aid and Alberta Training Program played an important part in helping to modify, improve and develop industrial arts programs in the secondary schools of Thailand.

Thirty-one industrial arts teachers and supervisors involved in the Thailand Comprehensive School Project and sponsored by Canadian aid program were trained at The University of Alberta during the years 1966 through 1970. The purpose of this research was to identify the achievement of these participants.

Procedures. The majority of the experimental sample consisted of the 31 Thai participants of Thailand Comprehensive School Project. They worked on industrial arts as their major field in the Graduate Diploma in Education at The

University of Alberta. Their assignments were composed of industrial arts courses, related courses and English language programs. The data collection from their assignments consisted of the Mean Final GPA computed from the grades of their courses work, and the Final Scores of a TOEFL test. The main source of this data was derived from the files of the Thailand Comprehensive School Project Office, University of Alberta.

Statistical treatments used in testing the hypotheses were t-test analysis, Pearson's Product-moment Correlation Coefficient. These tests were used to determine significant differences and relationships of the ten hypotheses.

Results. There existed the significant differences between the Mean Final GPA in all industrial arts course scores of all industrial arts participants and the Mean Final GPA in all course scores of Graduate Diploma in Education of the total participants for the 1966 through 1970 groups; the Mean Final Scores in Vocational Education 361 of the industrial arts participants and the Mean Final Scores in the same course of the other academic participants for the 1968 and the 1970 groups; the Mean Final Scores of TOEFL test between all industrial arts and the total participants for the 1967 through 1970 groups; the Mean Final GPA in all course scores of Graduate Diploma in Education between the industrial arts and the total participants for the 1966, 1968, and the total groups; the Mean Final GPA in all related course scores

between industrial arts background participants for the 1966 through 1970 groups.

There existed significant relationships between the Mean Final GPA in all industrial arts course scores of the industrial arts participants and their Mean Final GPA in all related course scores for the 1967 group; between the Mean Final GPA in all course scores of Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all industrial arts course scores for the 1966 through 1970 groups; and between the Mean Final GPA in all course scores of Graduate Diploma in Education of all industrial arts participants and their Mean Final GPA in all related course scores for the 1966 through 1970 groups.

There existed non-significant differences in the Mean Final Scores in Vocational Education 361 between industrial arts participants and other academic participants for 1966 through 1970 groups; the Mean Final GPA in all course scores of Graduate Diploma in Education between the industrial arts participants and the total participants for the 1967 and 1970 groups. The Mean Final GPA in all industrial arts course scores between industrial arts and non-industrial arts background participants for the 1966 through 1970 groups.

There existed non-significant relationships between the Mean Final GPA in all industrial arts course scores of the industrial arts participants and their Mean Final GPA in all related course scores for the 1966, 1968, 1970, and the total groups; between the Mean Final GPA in

all industrial arts course scores of the industrial arts participants and their Mean Final Scores of TOEFL test for the 1967 through 1970 groups.

Conclusions

From the findings of the study, the following conclusions were made:

1. The significant results found by most statistical tests from the tables of findings in Chapter 4 indicated a possible higher degree of the achievement of the industrial arts participants.
2. All non-significant results indicated that the hypotheses were true. Consequently, these results did not indicate that the comparison between a group was better than the other group, and whether the Training Program was suited for them.
3. Considering the general results of the training programs, it was found that the Mean Final GPA in all industrial arts course scores (Table 3), Mean Final Scores of TOEFL test, (Table 5), Mean Final GPA of the Graduate Diploma Program (Table 6), and the Mean Final GPA in all Related Course Scores (Table 12) of all industrial arts participants were likely weka, while they had higher ability in taking Vocational Education 361 course when compared with the other academic groups or the whole group.
4. The relationship between course work found that

non-significance existed between industrial arts courses and the TOEFL test. There is a possibility that the industrial arts participants were weak in study of their field because of a weakness in English. One finding indicating significance between the Mean Final GPA of Graduate Diploma in Education and Mean Final GPA in all industrial arts course scores indicated the ability of the industrial arts participants to study.

5. The relationship between industrial arts and non-industrial arts background participants was found non-significant in their studies of industrial arts courses and significant in their related courses. These results indicated that the tests could not make sure that one was better than the other in studying industrial arts courses. However, industrial arts background participants was better than non-industrial arts background participants for studying the related courses.

Implications

The results of this study will be helpful to researchers as well as countries which are involved in educational aid exchanges. The examination of the findings in Chapter 4 will be helpful for the Canadian aid program and The University of Alberta when planning educational aid in relation to the responsibility on education at the international level.

The study will also be very helpful for the Thai

Government, in particular the Ministry of Education, helping it to realize the actual situation of its students who have been or are studying abroad, to examine the industrial arts education, and to consider the investment in developing programs sound enough to make a difference in the Thai future education.

In the eagerness to effect changes in introducing new concepts and principles of industrial arts education to the secondary school level, it is no surprise that some mistakes have been made. Experiences in schools are revealing some of these problems and pointing to the need for revision. The experiences gained in the past can now be used as a basis for assessing what should be the course for future action.

English is important for Thai students who will be studying abroad. Usually, the higher their ability in English, the higher scores they get, and vice versa. English laboratories provided both before participants came abroad and before attending classes should be mandatory and given sufficient time.

Table 2 of Chapter 3 indicated that each of the five groups of industrial arts students was trained in different subject areas which make them perceive the program with different degrees of usefulness. The Training Program should provide common subject areas which emphasize values of industrial arts in the comprehensive school.

The industrial arts training program for Thai teachers still needs inservice training abroad or inside the country for expanding the comprehensive school type of program throughout the country. Clear-cut goals, adequate planning, trained staff, and sufficient support from the Government are required.

With cooperative attitudes and skills on the part of the industrial arts counterpart and effective use of supervisors, the continued success on industrial arts education of the country will be realized.

BIBLIOGRAPHY

- Allen, Francis R., et al. Technology and Social Change. New York: Appleton-Century-Crofts, Inc., 1957.
- Baier, K. and Resher, N. Value and Future. New York: Collier-Macmillan Co., 1971.
- Barnett, H. G. Innovation: The Basic of Cultural Change. New York: McGraw-Hill Book Company, Inc.
- Best, J. B. Research in Education. Englewood Cliff: Prentice-Hall, Inc., 1957.
- Bryant, Peter C. Canada External Aid Program. Ottawa: Private Planning Association of Canada, 1965.
- Buchanan, R. A. Technology and Social Progress. Oxford: Pergamon Press, 1965.
- Carter, Good V. Dictionary of Education. New York: McGraw-Hill Book Company, 1959.
- Cetron, Marvin J. Technological Forecasting. New York: Gordon & Breach Science Publishers, 1969.
- Chareonchai, Ruang. "Industrial Arts in the Secondary Schools of Thailand." Unpublished Ph.D. Dissertation: The Ohio State University, 1963.
- Childe, Gordon. Man Makes Himself. New York: The Macmillan Company, 1969.
- College Entrance Examination Board (CEEB) and Educational Service. Test of English as a Foreign Language: Interpretative Information. New York, New Jersey, and Princeton, 1970.
- Cox, Jhon. "Correlation between Michigan and TOEFL Scores at the University of Mouston." Unpublished Manuscript, Spring, 1971.
- Crochran, Leslie. Innovative Program in Industrial Education. Bloomington, Illinois: McKnight & McKnight, 1970.
- Department of Secondary Education, Ministry of Education. "Report of Comprehensive School Project No. 1." Bangkok: Thailand, 1969.

_____. "Final Report Comprehensive School Project: No. 1: First Canadian Advisory Team." Bangkok; Thailand, 1969.

_____. "Final Report Comprehensive School Project No. 2: Second Canadian Advisory Team." Bangkok: Thailand, 1971.

Department of Secondary Education, Ministry of Education, "The Feasibility Study in Relation to a Comprehensive School Project in Thailand." Bangkok: Thailand, 1971.

Dunlop, Jhon T. Automation and Technological Change. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1962.

Educational Planning Office, Ministry of Education. The Diffusion of Educational Innovation in the Government Secondary Schools of Thailand. Bangkok: Thailand, 1963.

_____. Secondary Education, Manpower and Educational Planning in Thailand. Bangkok: Thailand, 1966.

Ellul, Jacques, The Technological Society. New York: Alfred A. Knopf Inc., 1967.

Faculty of Education. "The University of Alberta-Thailand Comprehensive School Project: Final Report 1969-1972." Edmonton; University of Alberta, 1972.

Ferguson, George A. Statistical Analysis in Psychology and Education. New York: McGraw-Hill Book Company, 1966.

Ferkiss, Vicgor C. Technological man: The Myth and the Reality. New York: George Braziller, 1969.

Galbraith, Jhon Kenneth. The New Industrial State. Boston: Houghton Mifflin Company, 1967.

Gould, Jay M. The Technical Elite. New York: Augustus M. Kelley, 1966.

Grant, Vernon. Man, Education and Manpower. Washington, D.C.: The American Association of School Administrations, 1970.

Guba, E. J. and Clark, D. L. "Writing and Research or Development Proposal." Edmonton: Alberta, 1967.

Hagen, Elizabeth P. and Thorndike, Robert L. Encyclopedia of Educational Research. New York: The Macmillan Company, 1960.

Kerlinger, Fred N. Foundation of Behavioral Research. New York: Holt, Rinehart & Winson Inc., 1967.

Lathrop, Richard G. Introduction to Psychological Research. New York: Harper & Row, 1969.

Mesthene, Emmanuel G. Technological Change. New York: New American Library, 1970.

Miller, T. W. G. "Values in the Comprehensive School." Alva: University of Birmingham Institute of Education, 1961.

Morison, Elting E. Men, Machines and Organizations. Cambridge: M.I.T. Press, 1966.

National Study of Secondary School Evaluation. Evaluative Criteria, 1960 Edition. Washington, D.C.: National Study of Secondary School Evaluation, 1960.

Nimanheminda, S. "Higher Education in Thailand." Journal of the National Education Council, No. 6 PP. 1-49: Bangkok, January, 1970.

Piel, Gerard. The Acceleration of History. New York: Alfred A. Knopf, Inc., 1972.

Remmers, H. H. and Gage, N. L. Educational Measurement and Evaluation. New York: Harper & Brothers Publishing, 1955.

Riech, Charles. The Greening of America. New York: Random House, 1970.

Rokeach, M. A Theory of Organization and Change. San Francisco: Jossey-Bass Inc., 1958.

Silivious, Harold G. and Ralph, Bohn C. Organizing Course Material for Industrial Arts Education. Bloomington, Illinois: McKnight & McKnight Publishing Company, 1955.

Taba, Hilda. Curriculum Development Theory and Practice. New York: Harcourt, Brace and World Inc., 1962.

Van Dalen, D. B. Understanding Educational Research: An Introduction. New York: McGraw-Hill Book Company, 1962.

Walmsley, N. Canadian Universities and International Development Agency. Ottawa: Office of the Canadian International Agency, 1970.

Woodsworth, C. J. Canada and the Columbo Plan. Ottawa: Canadian Unionist, 1955.

Ziel, Henry R. Man-Science-Technology: An Educational Program. Edmonton, I.D.B. Press, 1971.